

Hazard Mitigation Planning on Cape Cod

Stacey Justus
Cape Cod Commission



What Is Hazard Mitigation?

Any sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects.



Barnstable County Cape Cod, Massachusetts

Natural Hazards Pre-Disaster Mitigation Plan

October 27, 2004

***Coordinated and written by the
Cape Cod Commission***

***Prepared for the Federal Emergency
Management Agency to comply
with the DMA Act of 2000***

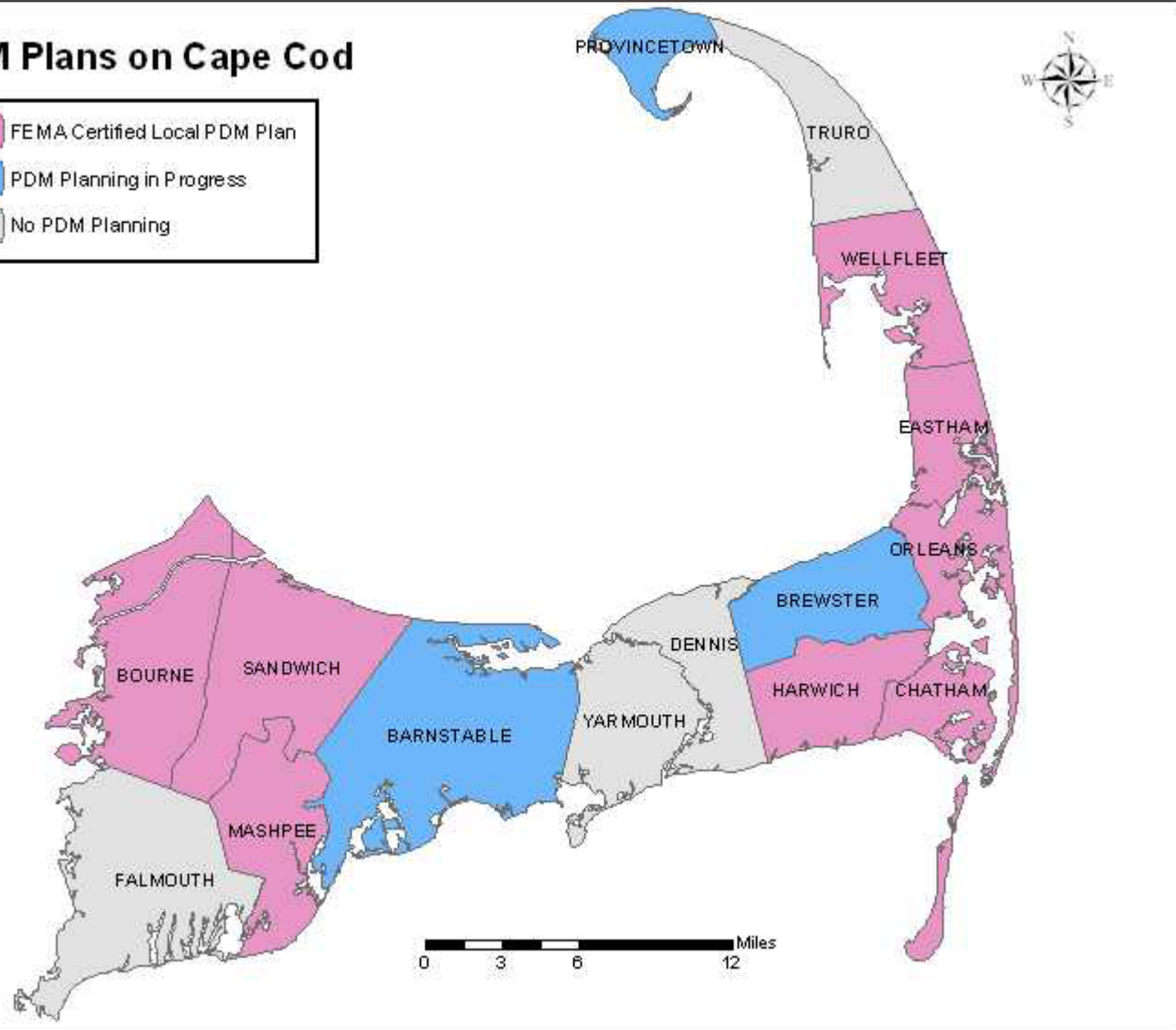
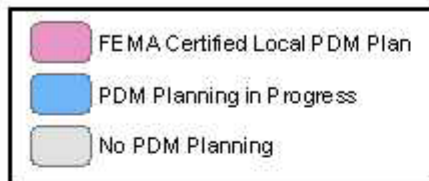
***Funded by FEMA through the
Massachusetts Emergency
Management Agency***

***Cover photos by:
NOAA; James F. O'Connell; COMM Fire Department***



Cape Cod Commission

PDM Plans on Cape Cod



Regional and Local PDM Plans =



- Hazard Mitigation Grant Program
- Flood Mitigation Assistance program
- Pre-Disaster Mitigation-Competitive grants



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Regional and Local PDM Plans =

- Good Planning
- Preparedness
- Responsibility
- Good Common Sense



Scope of Work - PDM

- 1. Develop the Planning Process**
 - Convene Regional *and* Local Teams**
- 2. Hazard ID & Risk Assessment**
- 3. Vulnerability Analysis**
- 4. Mitigation Strategy**
- 5. Plan Approval & Adoption**



Multiple Hazard Community Planning Team Members (as of August 2004):

Town Representatives

Barnstable – Tom Broadrick, Town Planner; Sergeant Scot McMahon, Police Department; Doug Bill, Associate Planner

Bourne – Coreen Moore, Town Planner; Lieutenant Joel Gould, Police Department, Emergency Management Director

Brewster – Elizabeth Taylor, Planning Board Chair; Lieutenant Dwayne Farley, Police Department

Chatham – Paul Lagg, GIS Coordinator; Paul DeCoste, Town Planner

Dennis – Dan Fortier, Town Planner

Eastham – Terry Whalen, Town Planner

Falmouth – Dan Bacon, Assistant Town Planner

Harwich – Susan Leven, Town Planner

Mashpee – Eric Smith, Assistant Town Planner

Orleans – George Meservey, Town Planner

Provincetown – Mark LaTour, Town Planner; Chief Ted Meyer, Police Department

Sandwich – Jo Anne Miller Buntich, Director of Planning & Development

Truro – John Sanguinet, Town Manager / Town Planner

Wellfleet – Rex Peterson, Assistant Town Administrator

Yarmouth – Terry Silva, Town Planner

Regional Representatives

American Red Cross – Cape Cod Chapter: Dea Yeater, Executive Director

Barnstable County's AmeriCorps Cape Cod: Mike Maguire

Barnstable County Department of Health & Environment: Sean O'Brien

Barnstable County Cooperative Extension: Jim O'Connell, Coastal Processes & Hazards Specialist

Barnstable County Regional Emergency Planning Comm.: Sean O'Brien

Cape Cod National Seashore: Lauren McKean, Planner (*invited*)

Massachusetts Emergency Management Agency: Doug Forbes, Region 1 Planner (*invited*)

Massachusetts Military Reservation: Brian Nickerson, Planner

NSTAR Electric: Jeff Luce, Community Relations & Economic Development Specialist (*invited*)

WHOI Sea Grant Program: Jim O'Connell, Coastal Processes & Hazards Specialist



Step 2: Risk Assessment -- A Necessity of All Planning

Risk Assessment

Identify Hazards
&
Assess Vulnerability
to these Hazards

Emergency Operations Plan

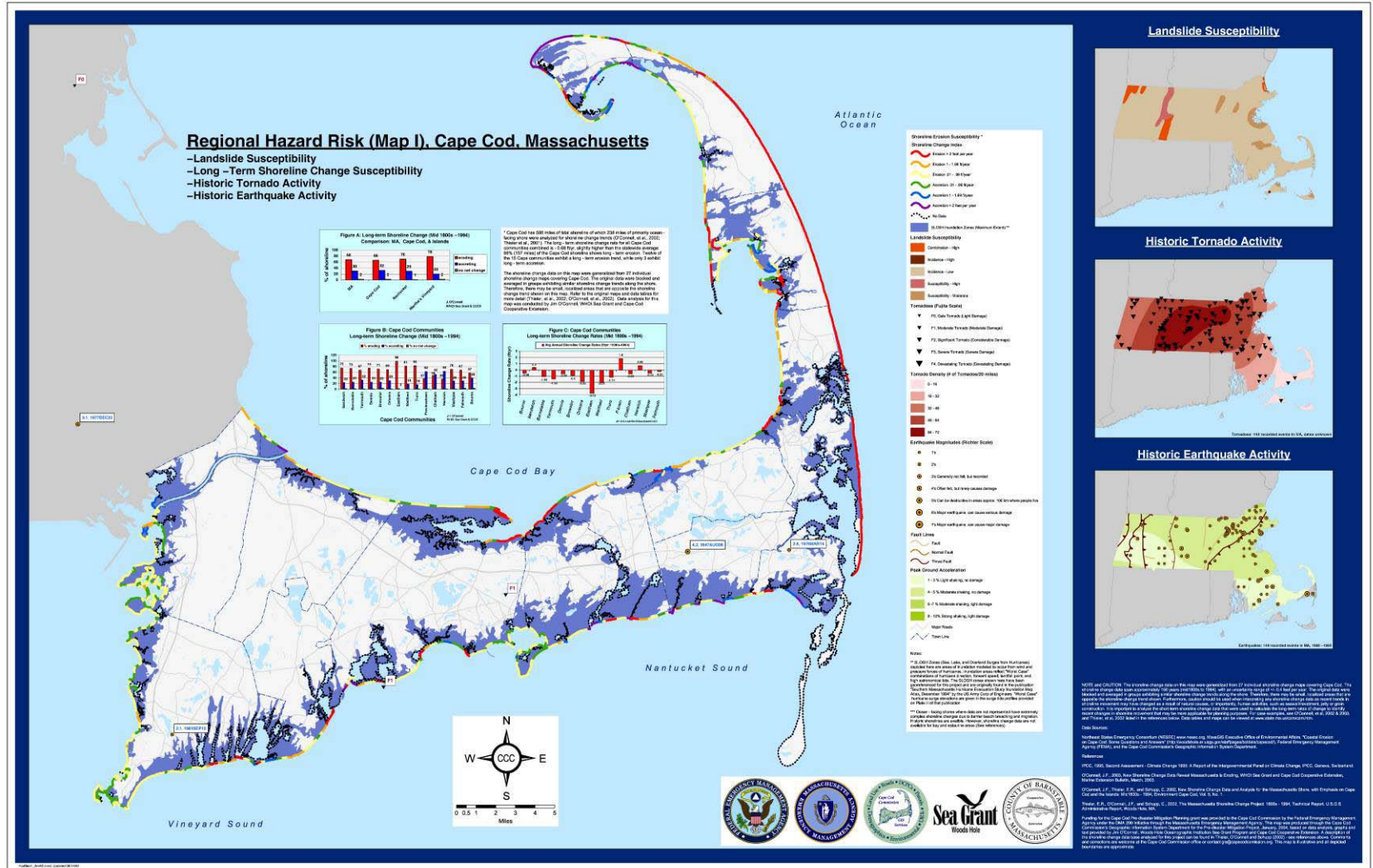
respond to events
to reduce loss
of life and property
(BCREPC)

Hazard Mitigation Plan

develop a strategy & methods
to reduce ***the risk*** of loss
of life and property
(PDM Planning - CCC)



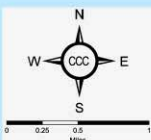
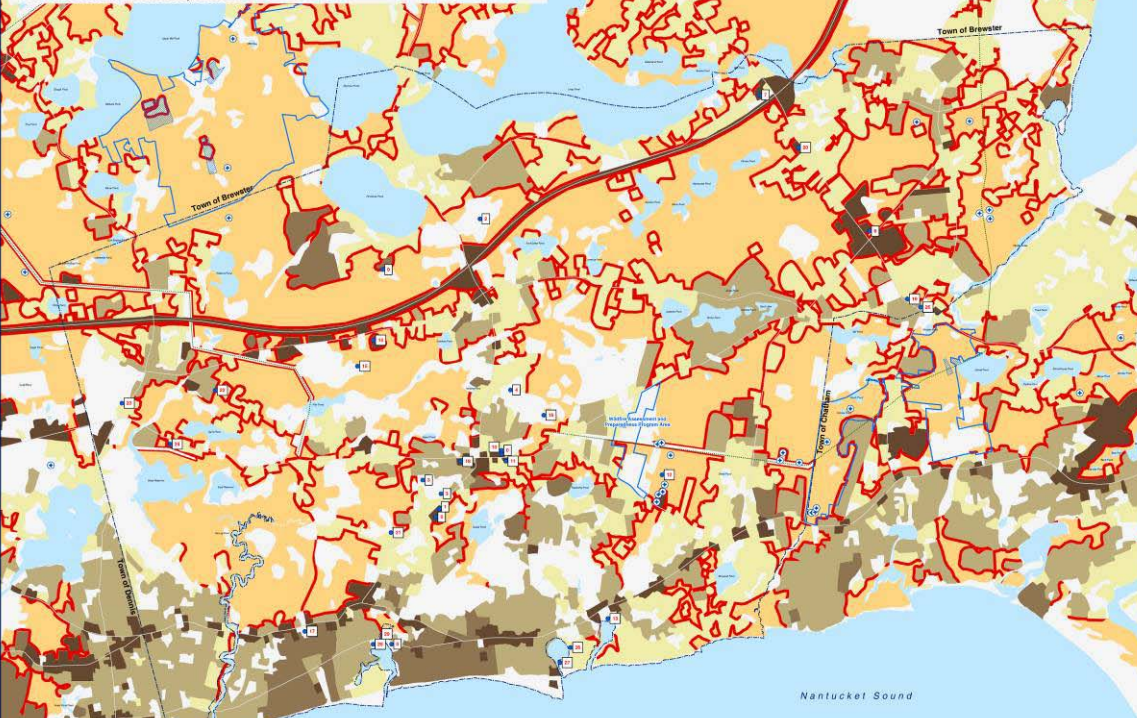
Risk Assessment Mapping



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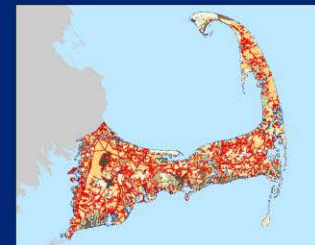
Regional Hazard Risk III. Cape Cod, Massachusetts -Wildfire Hazard Areas, Harwich



- Critical Facilities and Infrastructure:**
- A Emergency Facilities/Chillers
 - B Public Safety Facilities
 - C Hospitals/ Acute Care Facilities
 - D Town Government Facilities
 - E Wastewater Infrastructure
 - F Hazardous Material Facilities
 - G Schools
 - H Nursing Homes/Elderly Housing
 - I Group Day Care Facilities
 - J Senior/Youth/Recreation Centers
 - K Designated Emergency Animal Shelter/Hospitals
 - L Marine/Boat Yards

Facility #	Facility Name	Address	City/Town	County	Facility Type
1	Harwich Elementary School	100 Main St.	Harwich	Barnstable	Schools
2	Harwich Middle School	100 Main St.	Harwich	Barnstable	Schools
3	Harwich High School	100 Main St.	Harwich	Barnstable	Schools
4	Harwich Junior High School	100 Main St.	Harwich	Barnstable	Schools
5	Harwich Senior Center	100 Main St.	Harwich	Barnstable	Senior/Youth/Recreation Centers
6	Harwich Fire Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities
7	Harwich Police Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities
8	Harwich Town Office	100 Main St.	Harwich	Barnstable	Town Government Facilities
9	Harwich Wastewater Treatment Plant	100 Main St.	Harwich	Barnstable	Wastewater Infrastructure
10	Harwich Hazardous Waste Site	100 Main St.	Harwich	Barnstable	Hazardous Material Facilities
11	Harwich Boat Yard	100 Main St.	Harwich	Barnstable	Marine/Boat Yards
12	Harwich Animal Shelter	100 Main St.	Harwich	Barnstable	Designated Emergency Animal Shelter/Hospitals
13	Harwich Veterinary Hospital	100 Main St.	Harwich	Barnstable	Designated Emergency Animal Shelter/Hospitals
14	Harwich Fire Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities
15	Harwich Police Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities
16	Harwich Town Office	100 Main St.	Harwich	Barnstable	Town Government Facilities
17	Harwich Wastewater Treatment Plant	100 Main St.	Harwich	Barnstable	Wastewater Infrastructure
18	Harwich Hazardous Waste Site	100 Main St.	Harwich	Barnstable	Hazardous Material Facilities
19	Harwich Boat Yard	100 Main St.	Harwich	Barnstable	Marine/Boat Yards
20	Harwich Animal Shelter	100 Main St.	Harwich	Barnstable	Designated Emergency Animal Shelter/Hospitals
21	Harwich Veterinary Hospital	100 Main St.	Harwich	Barnstable	Designated Emergency Animal Shelter/Hospitals
22	Harwich Fire Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities
23	Harwich Police Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities
24	Harwich Town Office	100 Main St.	Harwich	Barnstable	Town Government Facilities
25	Harwich Wastewater Treatment Plant	100 Main St.	Harwich	Barnstable	Wastewater Infrastructure
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28	Harwich Animal Shelter	100 Main St.	Harwich	Barnstable	Designated Emergency Animal Shelter/Hospitals
29	Harwich Veterinary Hospital	100 Main St.	Harwich	Barnstable	Designated Emergency Animal Shelter/Hospitals
30	Harwich Fire Station	100 Main St.	Harwich	Barnstable	Public Safety Facilities

Wildfire Hazard Areas



Wildfire Hazard Areas

- Wildfire Risk*
- Wildland/Urban Interface**
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Commercial/Industrial Development
- Critical Facilities and Infrastructure
- Public Water Supplies
- Electric Transmission Lines
- Rail Lines
- Major Roads
- Town Line (Harwich)

*Wildfire Risk category includes unfragmented forest habitat MacConnell forest category greater than 40 acres and salt marsh areas greater than 3 acres.

**Wildland/Urban Interface includes areas adjacent to residential and commercial development, electrical transmission line and rail right-of-ways, and major transportation infrastructure that may represent an elevated risk.

Data Sources:

MacConnell Interface (April 1998)

Northeast States Emergency Consortium (NSEC) www.nsec.org, MassGIS Executive Office of Environmental Affairs, Regional Emergency Management Agency (REMA), Cape Cod State Emergency Response Team (CPSERT) www.cpsert.com, PADDIS (2002) www.paddis.org, USGS (2004) Topographic Data, and the Cape Cod Commission's Geographic Information System Department.

Funding for the Cape Cod Commission's Regional Planning grant was provided by the Cape Cod Commission to the MassGIS Emergency Management Agency. Funding for the data and planning was originally provided by the Federal Emergency Management Agency. Region 1000.

This map was developed by the Cape Cod Commission's Geographic Information System Department for the Cape Cod Commission's Regional Planning Project May 2004. Comments and corrections are welcome at the Cape Cod Commission Office or contact gis@capecodcommission.org. This map is tentative and all boundary lines are approximate.



Cape Cod Commission

Hazard Identification and Ranking for Cape Cod, Massachusetts

Natural Hazard	Location <u>Rate:</u> 1=small 2=medium 3= large	Frequency of Occurrence <u>Rate:</u> 0=unlikely 1=possible 2=likely 3=highly likely	Magnitude / Severity <u>Rate:</u> 1=limited 2=significant 3=critical 4=catastrophic	Hazard Ranking
Flood	2	3	4	9
Shoreline change (long term, sea level rise, or storm induced)	2	3	4	9
Wildfire	2	2	4	8
Snow & Ice Accumulation	3	3	2	8
Wind	3	3	2	8
Drought	3	2	1	6
Tornado	1	2	3	6
Earthquake	2	1	2	5

Scope of Work - PDM

1. Develop the Planning Process
2. Hazard ID & Risk Assessment
3. Vulnerability Analysis
4. Mitigation Strategy
5. Plan Approval & Adoption

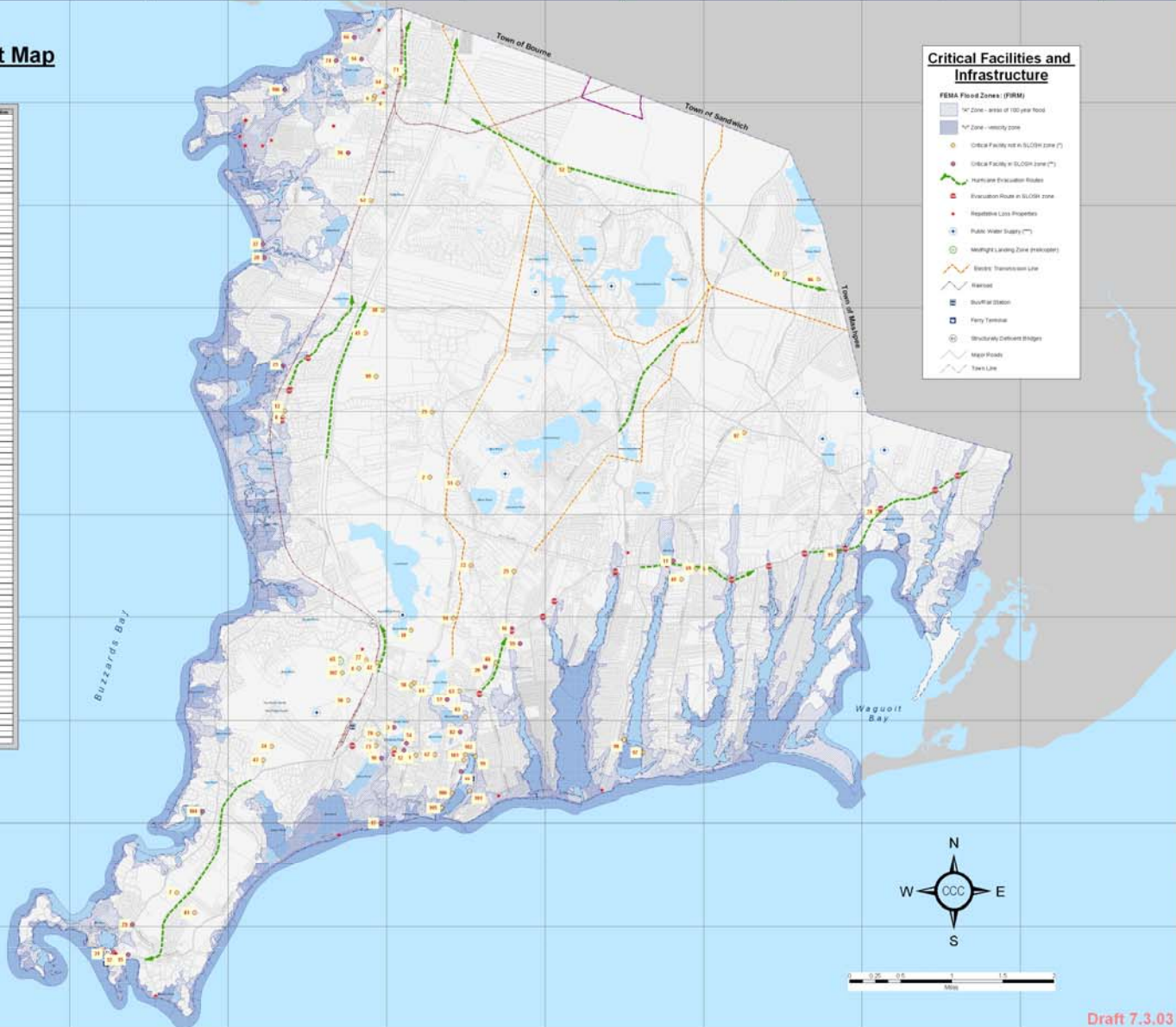


Risk and Vulnerability Assessment Map Town of Falmouth, MA

[illegible]

Critical Facilities and Infrastructure:

- A Emergency Facilities/Shelters
- B Public Safety Facilities
- C Hospitals/Acute Care Facilities
- D Town Government Facilities
- E Wastewater Infrastructure
- F Hazardous Material Facilities
- G Schools
- H Nursing Homes/Elderly Housing
- I Group Day Care Facilities
- J Senior/Youth/Recreation Centers
- K Designated Emergency Animal Shelters/Hospitals
- L Marinas/Boat Yards



Data Sources: (Note: not all features are present in each town.)

FEMA Flood Hazard Area: Flood Insurance Rate Maps, 1:4800, Federal Emergency Management Agency, 1986. Due to insufficient accuracy of the source maps, areas shown have been digitized and adjusted to match to match the MassGIS 1:25000 road network by the Cape Cod Commission. Exact flood hazard boundaries may need to be determined by land survey methods as used by FEMA.

*SLOSH Zone: (Sea, Lake, and Overland Surges from Hurricanes) These are areas of inundation modeled to occur from wind and pressure forces of hurricanes. The SLOSH zones are not shown on this map. The determination was based on consultation of the "Southern Massachusetts Hurricane Evacuation Study Inundation Map Atlas, December 1994" US Army Corp of Engineers.

** Critical Facilities in SLOSH Zones include properties where only part of the parcel is within the SLOSH Zone.

The Critical Facility labels on the map consist of a Parcel ID which corresponds to a table included on the map. The Facility Type can be identified from the key included on the map.

Repetitive loss property: Known to be incomplete, but based upon best available information from FEMA.

Evacuation Route: MEMA. Best available information from Local Comprehensive Emergency Management Plans on file with the Massachusetts Emergency Management Agency.



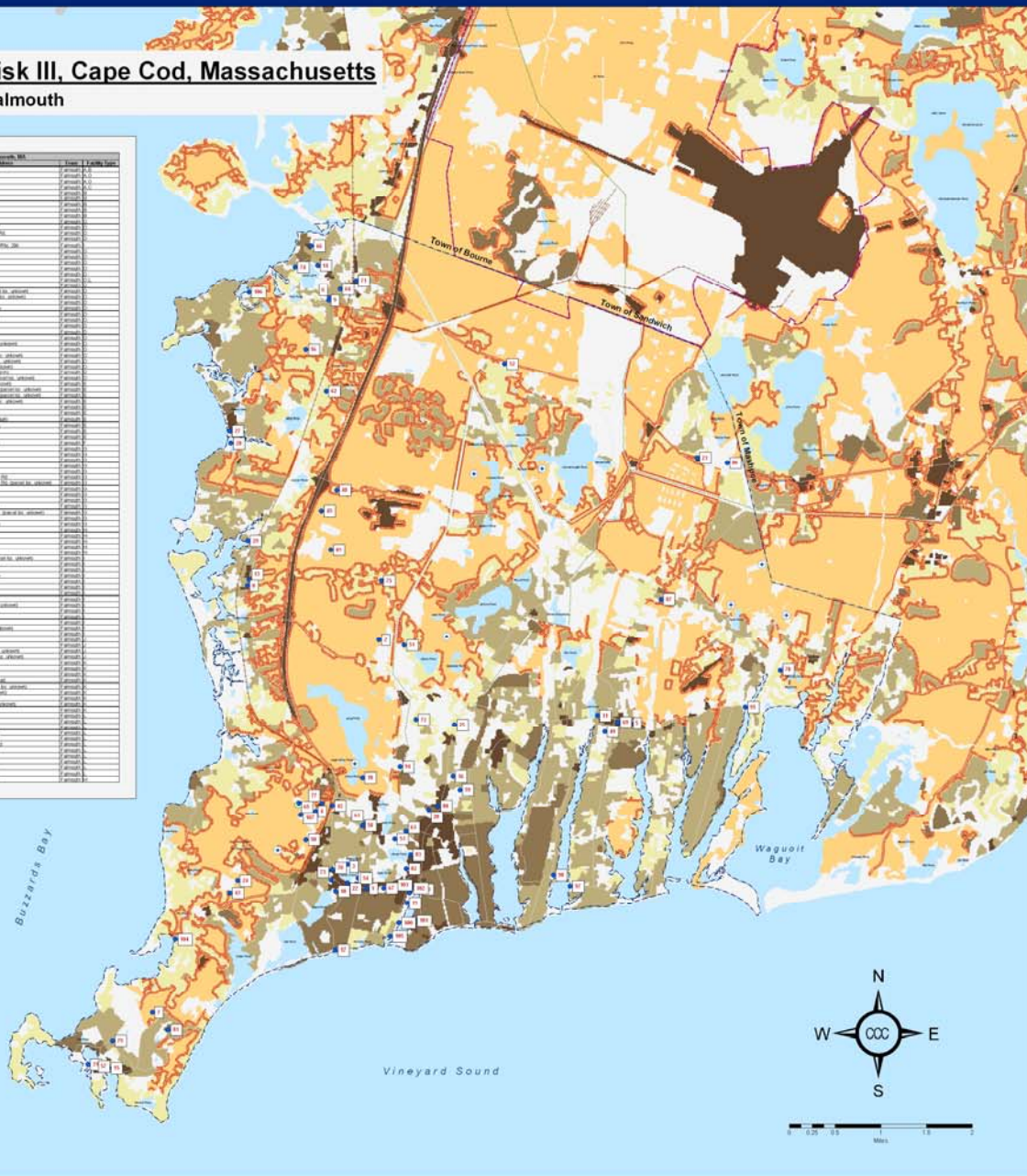
This map was produced by the Cape Cod Commission Geographic Information System Department for the Pre-Disaster Mitigation Project. Digital data used are from MassGIS and the Cape Cod Commission, 2003. Data bases associated with critical facilities were researched by AmeriCorps of Cape Cod.

Information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel level analysis.

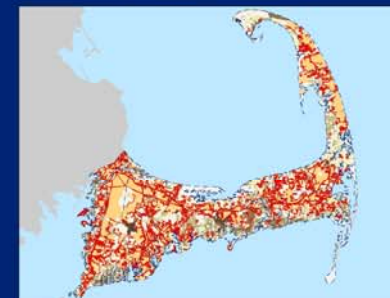
Regional Hazard Risk III, Cape Cod, Massachusetts

- Wildfire Hazard Areas, Falmouth

Parcel ID	Owner Name	Address	City/Town	County	State	Zip	Latitude	Longitude
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Wildfire Hazard Areas



Wildfire Hazard Areas

- Wildfire Risk
- Wildland/Urban Interface
- Residential and Commercial Development
 - High Density Residential
 - Medium Density Residential
 - Low Density Residential
- Commercial/Industrial Development
- Critical Facilities and Infrastructure
- Public Water Supplies
- Mediac Landing Zone (Helicopter)
- Electric Transmission Lines
- Rail Lines
- Major Roads
- Massachusetts Military Reservation
- Town Line (Falmouth)

*Wildfire Risk category includes unfragmented forest habitat MacConnell forest category greater than 40 acres.

**Wildland/Urban Interface includes areas adjacent to residential and commercial development, electrical transmission line and rail right-of-ways, and major transportation infrastructure that may represent an elevated risk.

Data Sources:
 MacConnell (vector) (digit) 1999
 Northeast United States Emergency Commission (NESEC) www.nesec.org, Massachusetts Executive Office of Environmental Affairs, Federal Emergency Management Agency (FEMA), Cape Cod Bay Watershed National Wetlands Inventory (http://www.epa.gov/capewatershed/), and the Cape Cod Commonwealth Geographic Information System (GIS) (http://www.cape-cod.com/gis/).
 Funding for the Cape Cod Pre-Disaster Mitigation Planning grant was provided by the Cape Cod Commission to the Massachusetts Emergency Management Agency. Funding for statewide FCM planning was originally provided by the Federal Emergency Management Agency - Region 1 under the DMA 2000 initiative.
 This map was produced by the Cape Cod Commission's Geographic Information System Department for the Pre-Disaster Mitigation Project May 30, 2004. Comments and corrections are welcome at the Cape Cod Commission office or contact gis@cape-cod.com or 508.325.1234. This map is illustrative and all depicted boundaries are approximate.





Regional Vulnerability Summary

- 43% of year-rounders reside in a SLOSH zone (25,335 > 65)
- Cape's land area = 17% in FIRM; 22% in SLOSH
- 85 intersections of evacuation routes with SLOSH zone
- 179 critical facilities located in a SLOSH
- 125 Repetitive Loss Properties



Scope of Work - PDM

1. Develop the Planning Process
2. Hazard ID & Risk Assessment
3. Vulnerability Analysis
4. **Mitigation Strategy = 23 Actions**
5. Plan Approval & Adoption



Hazard Mitigation Planning asks the following:

1. Where are the hazards?
2. What are the risks?
3. What is already being done?
4. What is not being done?
5. What actions can be taken?
6. What are our priorities?
7. How can we implement?



Action Item Categories:

- Planning
- Programs or initiatives
- Convening
- Education
- Infrastructure
- General Actions



Barnstable County Cape Cod, Massachusetts

Natural Hazards Pre-Disaster Mitigation Plan

October 27, 2004

*Coordinated and written by the
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*Prepared for the Federal Emergency
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*Cover photos by:
NOAA; James F. O'Connell; COMM Fire Department*



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Challenges & Barriers to Implementation:

- Funding
- Voluntary nature of implementation
- What do we do anyway?
- Lack of local staff and government support



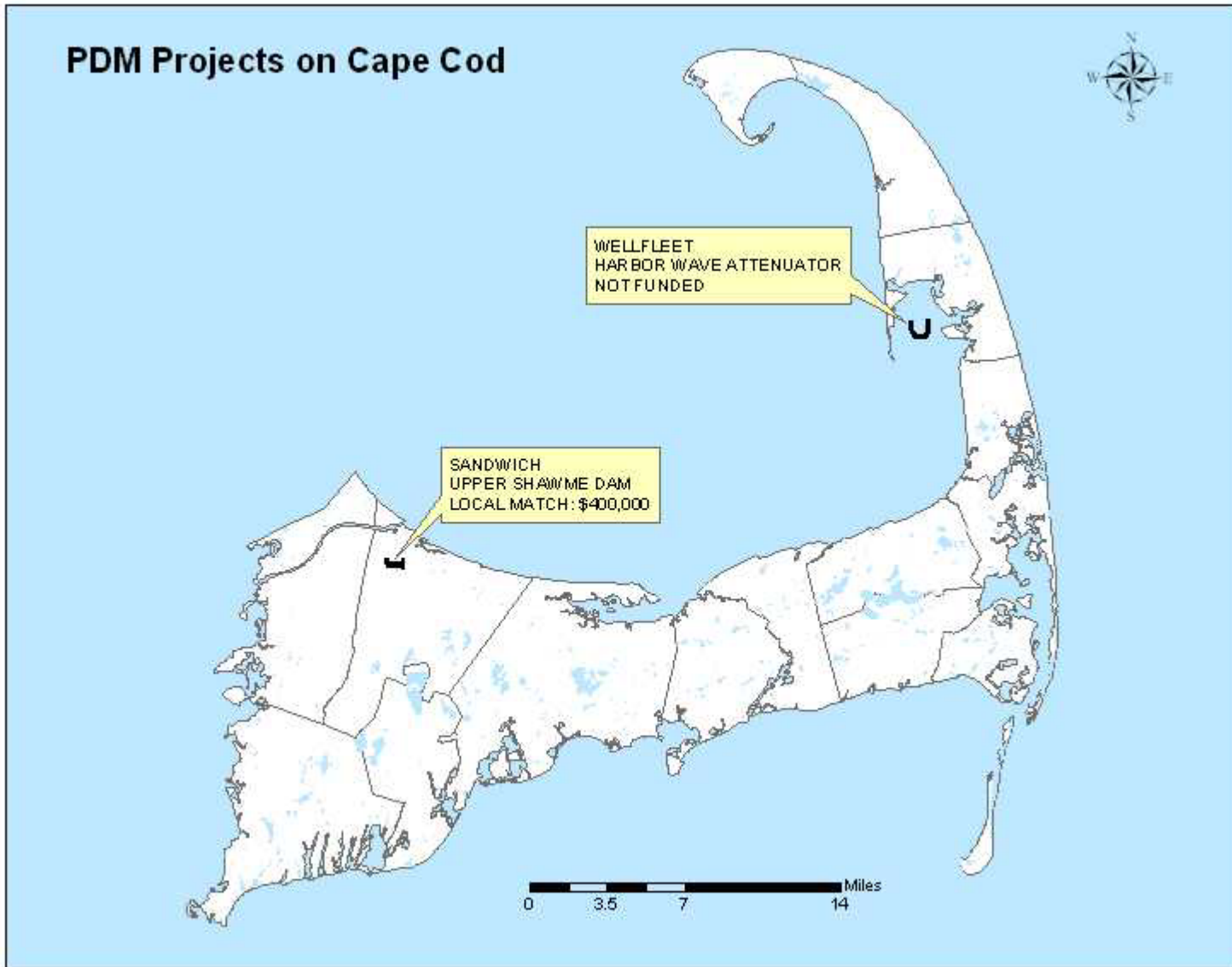
Barrier = No “engineered” projects

Action Item #19

County to seek funding to develop and administer **mini-grants** to towns to identify, prioritize, and engineer infrastructure projects.



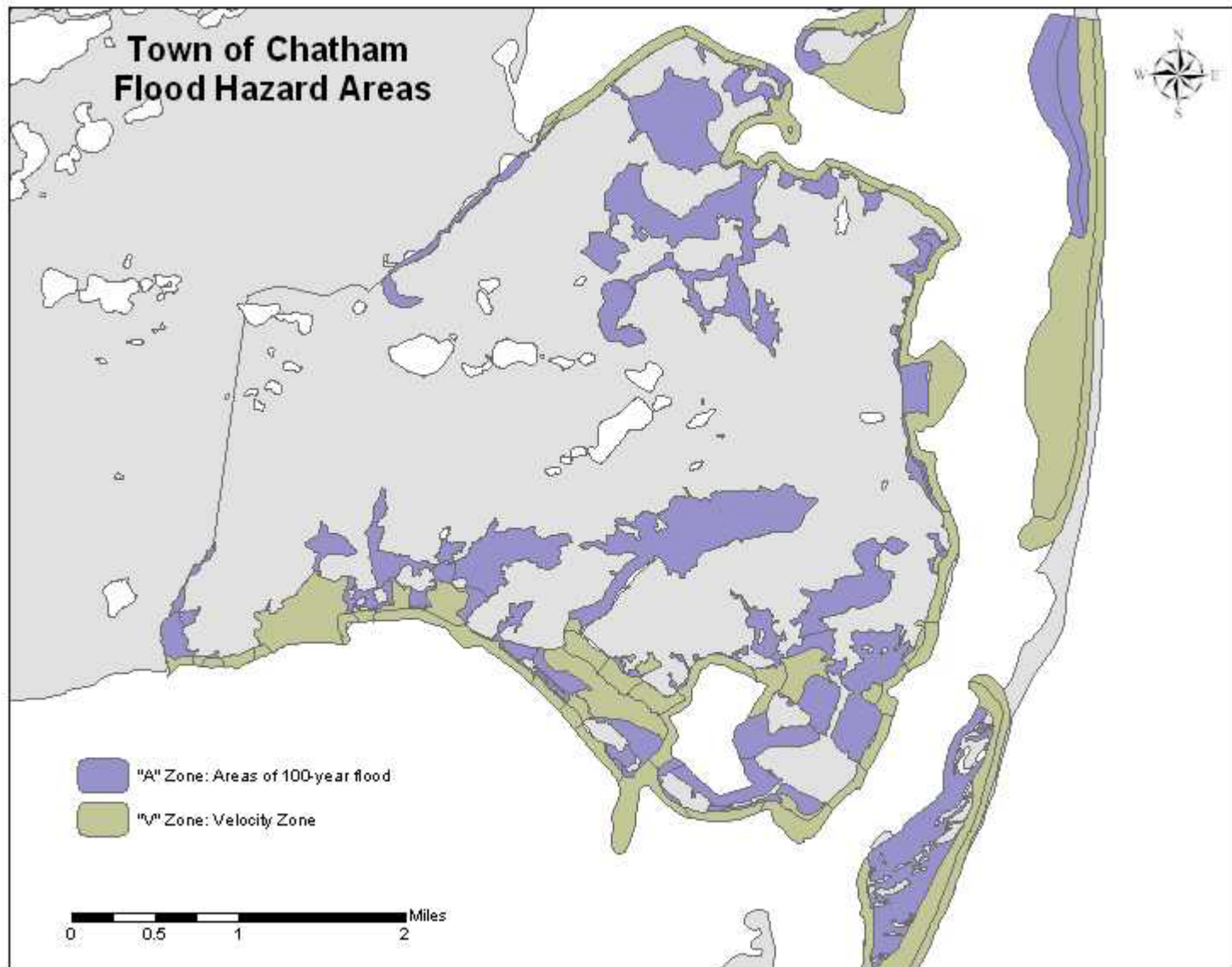
PDM Projects on Cape Cod



Regulatory Barriers to Hazard Mitigation

- Lack of hazard related Bylaws
 - Flood Plain bylaws
- Variances
 - granted too freely under the WPA & zoning
- Grandfathered uses and structures
- Reliance on unrelated Regulations for prohibitions (Title V)





General Barriers to Hazard Mitigation Planning

- Science not getting incorporated into local planning & bylaws
- Building Code not addressing Sea Level Rise
- Outdated flood mapping



Regional Needs for Successful Implementation:

- PDM “Circuit Riders”
 - support to local PDM implementation
- Haz Mit Planner at each RPA
 - start with coastal RPAs
- GIS work regionalized
 - to much for each town to do



Hazard Mitigation Planning on Cape Cod



Presented by
Stacey Justus
Cape Cod Commission

Action Item # 1

Implement, continue, and expand the regional hazard mitigation work begun under this Planning Grant from MEMA.

- The County should **provide continued staff resources**
- The County should **provide direct services to towns**



Action Item #18

**Develop a multifaceted regional
hazard mitigation **education**
program**

Example:

Cape Cod Emergency Preparedness Handbook: A Guide
to Natural Disasters

